

CLAIMS

We claim:

1. A method of monitoring an amount of refrigerant in a refrigerant system that has an expansion device, comprising:

determining an operating position of the expansion device.
2. The method of claim 1, wherein the expansion device has a plurality of operating positions including a fully open position and the method includes determining when the expansion device is in the fully open position.
3. The method of claim 2, including determining if the amount of refrigerant is below a desired amount responsive to determining that the expansion device is in the fully open position.
4. The method of claim 2, including determining when at least one other system characteristic indicates that the expansion device is in the fully open position for a reason other than the amount of refrigerant being below the desired amount.

5. The method of claim 4, including determining at least one of an indoor temperature, an outdoor temperature, a system low side pressure, or a system high side pressure to determine if the expansion device is in the fully open position for a reason other than the amount of refrigerant being below the desired amount.

6. The method of claim 1, including associating a switch with the expansion device such that the switch provides an indication of when the expansion device is in the fully open position.

7. A refrigerant system, comprising:
 - a compressor;
 - a condenser in fluid communication with at least the compressor;
 - an evaporator in fluid communication with at least the condenser;
 - an expansion device between the condenser and the evaporator, the expansion device having a fully open position where the expansion device allows a maximum flow between the condenser and the evaporator; and
 - a controller that determines if an amount of refrigerant in the system is below a desired amount responsive to the expansion device being in the fully open position.
8. The system of claim 7, wherein the expansion device provides an indication of when the expansion device is in the fully open position to the controller.
9. The system of claim 8, including a switch associated with the expansion device, the switch being activated to provide a signal to the controller when the expansion device is in the fully open position.
10. The system of claim 9, wherein the switch is positioned within the expansion device and the expansion device includes a plunger member that activates the switch when the plunger member moves into the fully open position.

11. The system of claim 7, wherein the controller automatically shuts down at least a portion of the system responsive to determining that the amount of refrigerant is below a desired amount.

12. The system of claim 7, wherein the controller provides an indication that the refrigerant amount is below the desired amount.

13. The system of claim 7, wherein the controller determines when at least one other system characteristic indicates that the expansion device is in the fully open position for a reason other than the amount of refrigerant being below the desired amount.

14. The system of claim 13, wherein the controller determines at least one of an indoor temperature, an outdoor temperature, a system low side pressure or a system high side pressure to determine if the expansion device is in the fully open position for a reason other than the amount of refrigerant being below the desired amount.

15. An expansion device for use in a refrigerant system, comprising
a valve member that is moveable between a closed and a fully open position; and
a signal generator that generates a signal indicating when the valve member is in the fully open position.
16. The device of claim 15, wherein the signal generator comprises a digital switch.
17. The device of claim 16, including a housing and wherein the switch is supported in the housing such that the valve member activates the switch when the valve member moves into the fully open position.
18. The device of claim 15, including a controller that is programmed to determine if an amount of refrigerant is below a desired amount responsive to the signal indicating that the valve member is in the fully open position.